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Maternal psychological distress after preterm birth: Disruptive or adaptive?

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ABSTRACT

Background: Maternal postpartum distress is often construed as a marker of vulnerability to poor parenting. Less is known, however, about the impact of postpartum distress on parenting an infant born prematurely. The present study investigated whether high distress levels, which are particularly prevalent in mothers of preterm born infants, necessarily affect a mother's quality of parenting. **Method:** Latent Class Analysis was used to group mothers (N = 197) of term, moderately, and very preterm born infants, based on their levels of distress (depression, anxiety, and PTSD symptoms) at one month postpartum, and their quality of parenting at one and six months postpartum. Parenting quality was assessed on the basis of maternal interactive behaviors (sensitivity, intrusiveness, and withdrawal) using observations, and maternal attachment representations (balanced, disengaged, or distorted) using interviews. **Results:** A 5-Class model yielded the best fit to the data. The first Class (47%) of mothers was characterized

by low distress levels and high-quality parenting, the second Class (20%) by low distress levels and low-quality parenting, the third Class (22%) by high distress levels and medium-quality parenting, the fourth Class (9%) by high distress levels and high-quality parenting, and finally the fifth Class (2%) by extremely high levels of distress and low-quality parenting. **Conclusions:** While heightened distress levels seem inherent to preterm birth, there appears to be substantial heterogeneity in mothers' emotional responsivity. This study indicates that relatively high levels of distress after preterm birth do not necessarily place these mothers at increased risk with regard to poor parenting. Conversely, low distress levels do not necessarily indicate good-quality parenting. The results of the present study prompt a reconsideration of the association between postpartum distress and parenting quality, and challenge the notion that high levels of maternal distress always result in low-quality parenting practices.

INTRODUCTION

Within the field of developmental psychology, the effects of maternal postpartum psychological distress on child development have received much attention. Moreover, the prevention, diagnosis, and treatment of distress in mothers is given much emphasis in pre-, peri- and postnatal healthcare. Prior studies reported that postpartum distress is quite common among new mothers, with prevalence estimates around 10-15% for postpartum depression (Brockington, 2004), around 8-10% for postpartum anxiety (Woolhouse, Brown, Krastev, Perlen, & Gunn, 2009), and between 1.7-9% for post-traumatic stress responses (PTSD; Beck, Gable, Sakala, & Declercq, 2011), with considerable comorbidity between the different types of distress (Austin et al., 2010). These prevalence rates have raised concern among healthcare

providers, because negative postpartum emotions are known to affect not only maternal wellbeing, but also infant developmental outcomes. More specifically, maternal distress after childbirth can have a long-term adverse impact on the infants' quality of attachment to their mothers, as well as on their behavioral, cognitive, and socio-emotional functioning (Glasheen, Richardson, & Fabio, 2010; Goodman et al., 2011).

Distress and parenting

The association between maternal postpartum distress and compromised infant development has been largely attributed to disturbances in the emotional and behavioral exchanges between the mother and her infant (Giallo, Cooklin, Wade, D'Esposito, & Nicholson, 2014). Maternal distress can interfere with the mother's ability to form positive expectations and representations of her infant and to interact sensitively with her infant. For example, depressed or anxious mothers have been found to develop non-optimal (i.e., non-balanced) attachment representations and, in particular, distorted representations of the infant; that is, representations characterized by insensitivity or unrealistic expectations of the infant and by incoherent, confused, preoccupied, contradictory, or even bizarre descriptions of the infant (see Vreeswijk, Maas, & Van Bakel, 2012, for a review). Furthermore, maternal distress is a key factor affecting mothers' parenting practices. Depressed or anxious mothers have been observed to engage not only in withdrawn, passive, or disengaged interactional behaviors, but also in intrusive, controlling, or hostile parent-infant interactions (Goodman & Brand, 2009).

Distress and parenting after preterm childbirth

Whereas postpartum psychological distress is quite common in mothers of infants born at term gestation, mothers of infants born preterm experience even more often high levels of distress (Bener, 2013). Postpartum depression rates of up to 40 percent (Vigod, Villegas, Dennis, & Ross, 2010), and anxiety and PTSD prevalence rates of up to 23 percent (Feeley et al., 2011; Lefkowitz, Baxt, & Evans, 2010) have been reported among mothers of preterm infants. These substantial percentages are not surprising, as mothers are confronted with various serious stressors after preterm birth. The infant's physical condition, early separation from the infant, uncertainty about the infant's outcome, and anticipated loss of the infant, are only some of the stressors that may result in feelings of stress, depression, anxiety, and even to symptoms of traumatization in mothers (Goldberg & DiVitto, 2002). Given the complications and challenges that accompany parenting an infant born preterm, one might conclude that heightened levels of distress are inherent to the situation these mothers find themselves in. It remains debatable, however, as to whether or not heightened maternal stress levels after preterm birth are necessarily associated with less adequate parenting.

This specific question has previously been addressed in a small number of studies yielding inconclusive findings. On one hand, some studies indicated that mothers of preterm infants who experience high levels of distress are at serious risk with regard to adverse parenting. These studies revealed higher incidences of non-optimal and unbalanced attachment representations and a lower quality of maternal interactive behaviors among mothers with high distress levels after preterm birth (Forcada-Guex, Borghini, Pierrehumbert, Ansermet, & Muller-Nix, 2011; Muller-Nix et al., 2004). Other studies, however, suggested that in cases of preterm birth some degree of distress in mothers is inevitable, and perhaps even beneficial for

parenting an infant born preterm. Borghini et al. (2006), for instance, demonstrated that particularly mothers of high-risk preterm infants who were emotionally distressed, anxious, and worried about their child's health and future development in the postpartum period developed a strong bond with their infant. The authors linked maternal emotional arousal after preterm birth to higher maternal involvement (e.g., providing comfort care). In line with this, Levy-Shiff (1989) and Holditch-Davis, Schwartz, Black and Scher (2007) showed that mothers of preterms who were highly distressed and concerned due to the hospital environment and their infant's health condition showed more caregiving behaviors during the infant's hospitalization and after discharge of the infant. Mothers who experience emotional arousal because of their infant's fragile condition, may adopt a compensatory parenting style in which they attune and adjust their behavior to the needs and capacities of their immature infant. Inhibition and suppression of maternal emotions, in contrast, could lead to detachment and difficulties in establishing a close mother-infant relationship.

The present study

In this explorative study, we investigated whether heightened levels of maternal distress after preterm birth place mother-infant dyads at risk for poor parenting. We hypothesized that distinct subgroups of mothers could be identified on the basis of maternal levels of distress and parenting quality. Latent Class analysis (LCA) was used to examine the relation between maternal distress (PTSD, depression, and anxiety symptoms), at one month postpartum, and maternal quality of parenting (interactive behaviors and attachment representations) at one and six months postpartum, among mothers of term, moderately preterm, and very preterm

infants. The advantage of the use of LCA is its comprehensive approach to identify population heterogeneity in maternal levels of distress and parenting quality.

METHOD

Participants

This study is part of a larger longitudinal study among parents with term and preterm infants (Tooten, 2012), receiving ethical approval from the Catharina Hospital, Eindhoven, The Netherlands. Two-hundred and twenty-two mothers of term and preterm infants participated in the study, of whom 197 provided data for at least one of the distress measures *and* at least one data point on the parenting variables. The analysis sample consisted of 71 mothers of term infants (≥ 37 weeks gestational age (GA)), 64 mothers of moderately preterm infants (≥ 32 - < 37 weeks GA), and 62 mothers of very preterm infants (< 32 weeks GA) (total N = 197). Six mothers dropped out of the study at six months postpartum, an attrition rate of 3%. The data were characterized by few missing values: between 1.5%-3.6% of the distress outcomes, 3% of the parenting outcomes, and between 0%-3.6% of the variables for post-hoc comparisons were missing. No systematic patterns of or covariates related to missingness were found.

Mothers were recruited from eight maternity wards and two neonatal intensive care units in The Netherlands. Mothers with poor understanding of the Dutch language were excluded from participation. Eligible mothers were invited by nurses to participate before the delivery or within 24 hours after birth. The nurses informed the mothers about the aims and design of the study and provided them with an information brochure. It was emphasized that participation was voluntary, without financial compensation, and that they were free to

withdraw from the study at any time, with no consequences for treatment of the child. All participating mothers gave their written consent. Baseline demographic and clinical characteristics of the study participants are presented in Table 3.

Procedure

At one month postpartum, mothers were visited at home or in the hospital and asked to individually complete three questionnaires measuring psychological distress. In addition, video recordings of mother-infant interactions were made during daily moments of caretaking, e.g., bathing, feeding, changing; or touching, holding and vocalizing to the infant in case of a very preterm infant. These recordings were analyzed afterwards to evaluate the mother's interactive behavior. At six months postpartum, mothers were visited at home and interviewed. Video recordings of the interview were analyzed afterwards to evaluate the mothers' attachment representations of their infant.

Measures

Psychological distress

The 14-item *Perinatal Posttraumatic Stress Disorder Questionnaire* (PPQ; Quinnett & Hynan, 1999) was used to assess early maternal PTSD symptomology. Items were rated on a dichotomous scale (yes/no; sum-score range = 0-14), with higher scores reflecting more PTSD symptoms. Scores ≥ 6 correspond to mild or severe PTSD symptoms (Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex, & Ansermet, 2003).

The 10-item *Edinburgh Postnatal Depression Scale* (EPDS; Cox, Holden, & Sagovsky, 1987) was used to evaluate postpartum depression. Items were rated on 4-point Likert scales (sum-score range = 0-30), with higher scores indicating more depressive symptoms. Scores ≥ 10 indicate minor depression and scores ≥ 13 indicate major depression (Matthey, Henshaw, Elliott, & Barnett, 2006).

The 20-item *State-Trait Anxiety Inventory* (STAI-State; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) was used to determine levels of state anxiety. Items were rated on 4-point Likert scales (sum-score range = 20-80) with higher scores indicating higher levels of anxiety. A cut-off threshold of 40 is used to identify highly anxious women (Grant, McMahon, & Austin, 2008).

The questionnaires are reliable and well-validated measures to assess psychological distress in the postpartum period (Callahan & Hynan, 2002; Tendais, Costa, Conde, & Figueiredo, 2014). The internal consistency estimates in the present sample were good to very good for the PPQ ($\alpha = .78$), EPDS ($\alpha = .86$), and STAI-State ($\alpha = .94$).

Interactive behavior

Ratings of maternal interactive behavior were derived from 15-min video recordings capturing behavioral observations of daily dyadic mother-infant interactions. Mothers' verbal and nonverbal behaviors were rated by means of a coding manual (labeled NICHD coding scheme) developed by the U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Child Health and Human Development Early Care Research Network (1999). Minor adaptations were made to the instrument to make it applicable to our population

of mothers with preterm infants. In the original coding scheme maternal behavior is rated on six 4-point global items. In the present study, these items were combined into three subscales: 'Sensitivity to non-distress' and 'Positive regard for the infant' were combined to assess *Sensitivity*, 'Intrusiveness' and 'Negative regard for the infant' were combined to assess *Intrusiveness*, and 'Detachment' and 'Flatness of affect' were combined to assess *Withdrawal* in mothers. The subscale scores range from very uncharacteristic to very characteristic behavior on a 7-point scale (range = 1-7). A high score on *Sensitivity* indicates good timing faced to the infant's interest and arousal level, an appropriate level of stimulation, praising the infant, and speaking in a warm tone of voice during mother-infant interaction. Mothers with a high score on *Intrusiveness* generally fail to allow the infant a 'turn' or the opportunity to respond at his/her pace but instead offer a continuous barrage of stimulation. They may show disapproval of the infant's actions and can be rough in daily care routines. Mothers with a high score on *Withdrawal* rarely make eye contact with the infant and exhibit a blank facial expression. They talk to or touch the infant infrequently and respond minimally to the infant's vocalizations, smiles, or actions.

The videotapes were scored by independent coders. Prior to scoring, the coders received standardized training until 80% reliability was reached, along with regularly scheduled supervision. Approximately 15% of the videos were randomly selected and double coded. Intraclass correlation coefficients (ICC) for inter-rater agreement were .67 (sensitivity), .73 (intrusiveness), and .71 (withdrawal).

Attachment representations

Maternal attachment representations were assessed using the Working Model of the Child Interview (WMCI; Zeanah, Benoit, & Barton, 1986), a semi-structured interview developed to elicit and classify a parent's perceptions of and subjective experiences with the personality characteristics and behavior of the infant, as well as the relationship with the infant. Previous research has demonstrated substantial concordance between the WMCI and traditional measures of infant attachment (e.g., the Strange Situation) and adult attachment (e.g., the Adult Attachment Interview) (Benoit, Parker, & Zeanah, 1997).

The WMCI is scored on three subscales, including the *qualitative* (or organizational), *content*, and *affective* features of mothers' narratives. These subscales are used to classify mothers' representations as balanced, disengaged, or distorted. *Balanced representations* are characterized by rich and coherent ideas of the infant and of the relationship with the infant. They usually include both positive and negative characteristics of the infant. Parents are appreciative of the infant's subjective experiences, value the relationship with the infant, and respect the infant as an individual. Non-balanced representations, in contrast, can be either disengaged or distorted. *Disengaged representations* are characterized by a sense of indifference and emotional distance from the infant. The descriptions of the infant are primarily rational and unelaborated. Parents seem to devalue the impact of parenting on the infant's development. *Distorted representations* are predominantly characterized by confusion and preoccupation. Parents can be preoccupied with other concerns, resulting in an inability to focus incisively on characteristics of the infant. Moreover, they may have unrealistic expectations of their infant or are very insensitive to the infant.

The interviews were conducted by one of the researchers and lasted approximately 45-60 minutes. The interviews were videotaped and subsequently coded by the researchers (H.H., R.H., or A.T.) who are trained and reliable WMCI coders. Prior to scoring the interviews, the coders were trained by one of the authors (H.v.B.), who received training by the WMCI developers (Zeanah and Smyke), until 80% reliability was reached. To assess the level of agreement between raters, 20 interviews were randomly selected and double coded. The raters showed substantial agreement (Cohen's kappa = .68).

Analytic strategy

Latent Class Analysis (LCA), a comprehensive method of probabilistically classifying individuals from a heterogeneous population into smaller more homogenous unobserved subgroups, was used to identify subsets of mothers who share similar patterns of distress (i.e., PTSD, depression, and anxiety symptoms) and maternal interactive behaviors (i.e., sensitivity, intrusiveness, and withdrawal) at one month postpartum, and attachment representations (i.e., balanced, disengaged, or distorted) at six months postpartum. LCA was performed using Latent Gold Version 5.0 (Vermunt & Magidson, 2005), with the PPQ, EPDS, and STAI scores as continuous indicators, the NICHD scores as ordinal indicators, and the WMCI classifications as nominal indicators. To make use of all available data under the missing-at-random (MAR) assumption, a full information maximum likelihood procedure was used to estimate the models. To safeguard against local maxima, 250 random start values were used for each model. Model solutions starting from one up to seven classes were evaluated and compared. A final model was selected based on model fit as indicated by the Bayesian Information Criterion (BIC),

with lower values indicating a better relative fit (Nylund, Asparouhov, & Muthén, 2007). This was supplemented by information from various fit statistics including the AIC, the classification error, and the entropy R2. Along with inspection of a log likelihood scree plot (a visual inspection of where improvement in fit flattens out). Mothers were assigned to the class for which they had the highest posterior membership probability (i.e., modal assignment). The classes were subsequently compared on the proportion of mothers of term, moderately, and very preterm infants, as well as on infant medical data and maternal socio-demographic data using ANOVA's and chi-square tests in SPSS.

RESULTS

Extraction of latent classes

Five subgroups of mothers were identified and labeled based on their levels of postpartum distress and parenting quality. A 5-Class solution yielded the best fit to the data, see Table 1. The 5-Class model was compared with a 4-Class model, which was more parsimonious but had a slightly higher BIC value. A bootstrap LR test with 2000 replications showed that the more complex model with five classes fitted the data significantly better, $p < .001$. Furthermore, the classification error of 7% supports the feasibility of differential assignment of mothers across the 5 classes.

Table 1. Model comparison

Number of classes	BIC	AIC	Classification error	Entropy R2
1	5503	5428	0.00	
2	5331	5226	0.03	.86

3	5277	5142	0.07	.82
4	5243	5079	0.06	.86
5	5236	5042	0.07	.87
6	5239	5016	0.06	.87
7	5258	5005	0.11	.79

The analyses revealed that 47% (n = 96) of the mothers were in the first class, *Low distress – High-quality parenting (Class L-H)*, characterized by the lowest levels of psychological distress, high levels of sensitivity and low levels of intrusiveness and withdrawal behaviors, with mothers mainly having balanced attachment representations. 20% (n = 38) were in the second class, *Low distress – Low-quality parenting (Class L-L)*, characterized by low distress levels, low levels of sensitivity and moderate levels of intrusiveness and high levels withdrawal behaviors, with mothers mainly having disengaged representations of their infant. 22% (n = 42) were in the third class, *High distress – Medium-quality parenting (Class H-M)*, characterized by high distress levels, moderate levels of sensitivity, intrusiveness and withdrawal behaviors, with mothers mainly having balanced or distorted representations. 9% (n = 17) were in the fourth class, *High distress – High-quality parenting (Class H-H)*, characterized by high distress levels, the highest levels of sensitivity and the lowest levels of intrusiveness and withdrawal behaviors, with mothers mainly having balanced representations. Finally, 2% (n = 4) were in the fifth class, *Extreme distress – Low-quality parenting (Class E-L)*, characterized by very high distress levels, the lowest levels of sensitivity, the highest levels of intrusiveness, and high levels of withdrawal behaviors, with mothers all having distorted representations. The latent classes are depicted in Figure 1. The characteristics of the five classes are summarized in Table 2.

As a supplementary step, the rates of clinically significant levels of psychological disorders were examined. In classes L-H and L-L, 0%-5% of the mothers reported symptoms above the clinical thresholds for PTSD, depression, and anxiety, whereas the other classes comprised 36%-100% clinical cases (see Table 2).

Figure 1. Latent classes of maternal postpartum distress and parenting quality

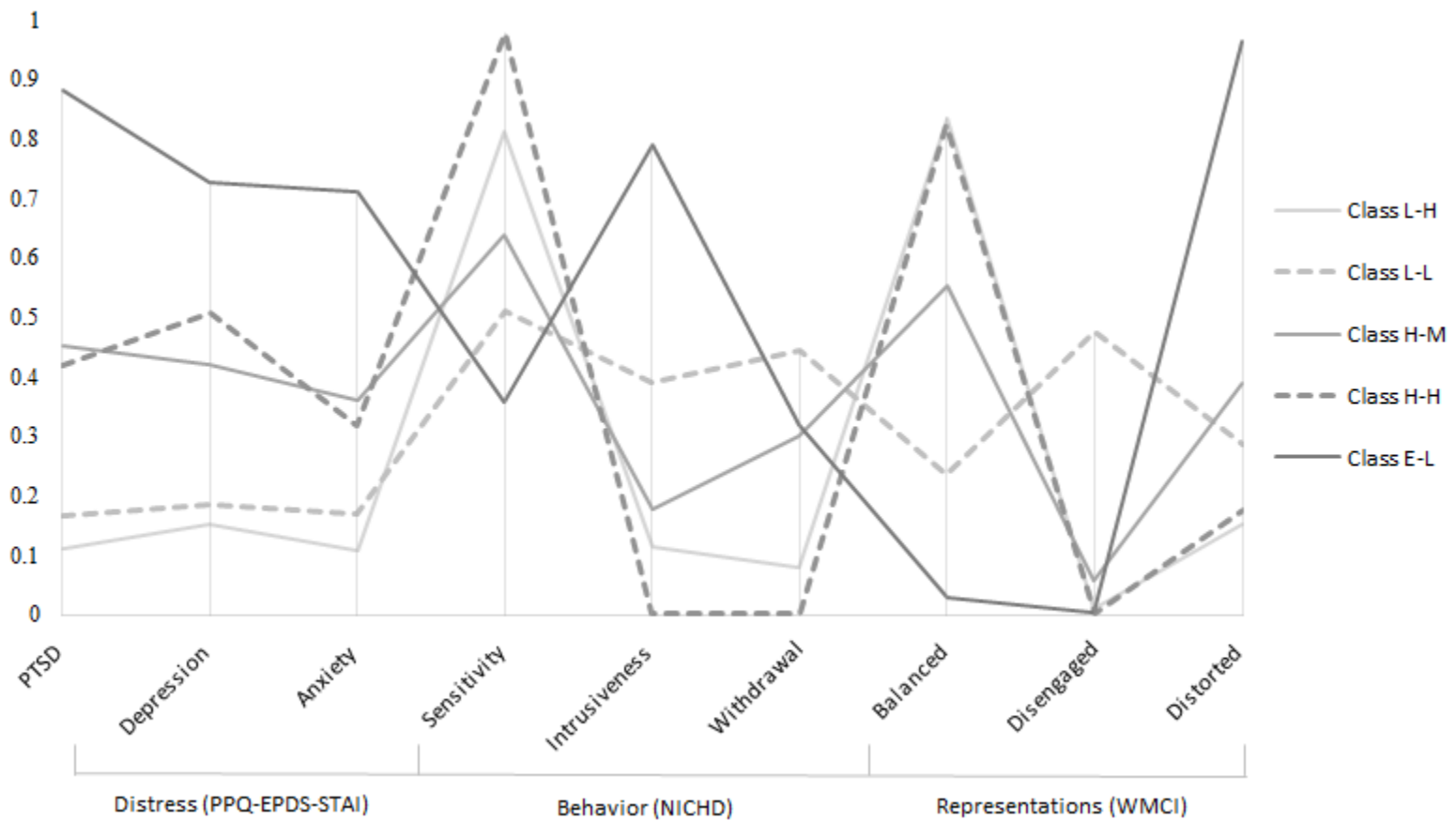


Table 2. Characteristics of the five classes in terms of psychological distress and parenting quality (N = 197).

	Class L-H n = 96, 47%	Class L-L n = 38, 20%	Class H-M n = 42, 22%	Class H-H n = 17, 9%	Class E-L n = 4, 2%
Psychological distress					
PPQ PTSD	1.59	2.27	6.25	5.87	12.33
Clinical cases, %	3	5	65	56	100
EPDS Depression	3.41	4.18	11.59	10.00	16.75
Clinical cases, %	1	5	73	47	100
STAI Anxiety	25.51	28.54	38.83	37.00	57.00
Clinical cases, %	0	0	38	36	100
Interactive behaviors					
Sensitivity	5.85	4.02	4.76	6.88	3.00
Intrusiveness	1.46	2.64	1.76	1.00	4.33
Withdrawal	1.44	3.28	2.55	1.00	2.67
Attachment Representations					
Balanced, %	84.95	16.22	53.66	81.25	0
Disengaged, %	0	56.76	4.88	0	0
Distorted, %	15.05	27.03	41.46	18.75	100

Numbers represent means, unless otherwise specified.

Clinical thresholds for distress symptoms: PPQ ≥ 6 , EPDS ≥ 10 , STAI > 40 .

Comparison of classes

Classes L-H, L-L, H-M, and H-H were compared on infant medical and maternal socio-demographic data. Class E-L consisted of just four mothers and was therefore excluded from post-hoc class comparisons and only described qualitatively.

The classes differed significantly on the infant's GA, see Table 3. The majority of mothers in Class L-H had a term-born infant and only 13% of them had a very preterm infant. Mothers in the other classes more often had a preterm infant, with an overrepresentation of mothers of very preterm infants in Class H-M and H-H. Moreover, infants of mothers in Class H-M and H-H more often had a fragile health status: a lower birth weight, lower Apgar score, and more days spent in the incubator and the hospital. The maternal data showed no significant differences for delivery mode, parity, age, and marital status. Yet significant differences were found for educational level. Mothers in Class L-H, M-H, and H-H were mainly mothers with a medium or high educational level, whereas mothers in Class L-L more often had low or medium educational levels.

Table 3. Differences between the classes in GA group, infant medical data, and maternal demographic data (N = 197).

	Class L-H	Class L-L	Class H-M	Class H-H	Class E-L ¹	F or χ^2 ¹	p
	n = 96, 47%	n = 38, 20%	n = 42, 22%	n = 17, 9%	n = 4, 2%		
	n (%), m (sd)	n (%), m (sd)	n (%), m (sd)	n (%), m (sd)	n (%), m (sd)		
Gestational age group						34.33	***
Term, <i>n</i>	49 (51.0) ^a	10 (26.3) ^{ab}	8 (19.0) ^b	4 (23.5) ^{ab}	0 (0.0)		
Moderately preterm, <i>n</i>	35 (36.5) ^a	13 (34.2) ^a	11 (26.2) ^a	4 (23.5) ^a	1 (25.0)		
Very preterm, <i>n</i>	12 (12.5) ^a	15 (39.5) ^b	23 (54.8) ^b	9 (52.9) ^b	3 (75.0)		
Infant data							
Birth weight, <i>grams</i>	2790 (891) ^a	2328 (987) ^b	1904 (919) ^b	1964 (1083) ^b	1139 (649)	10.66	***
5-min Apgar	9.3 (1.1) ^a	8.8 (1.2) ^{ab}	8.7 (1.4) ^b	8.5 (1.9) ^{ab}	7.0 (3.2)	4.17	*
Incubator, <i>days</i>	6.7 (16.1) ^a	14.0 (17.7) ^{ab}	25.9 (24.7) ^c	27.6 (27.6) ^{bc}	44.0 (33.3)	11.84	***
Hospital, <i>days</i>	15.3 (23.1) ^a	27.2 (27.7) ^{ab}	42.5 (36.4) ^b	40.3 (35.3) ^b	67.3 (35.1)	10.45	***
Male Sex, <i>n</i>	42 (44.2)	23 (60.5)	21 (50.0)	11 (64.7)	1 (25.0)	4.41	<i>ns</i>
Twin, <i>n</i>	10	5	8	1	1 (25.0)	4.18	<i>ns</i>
Maternal data							
First born infant, <i>n</i>	60 (62.5)	22 (57.9)	27 (64.3)	15 (88.2)	4 (100)	5.05	<i>ns</i>
Maternal age, <i>years</i>	32.4 (4.5)	32.4 (6.3)	32.1 (4.9)	30.0 (3.4)	28.9 (8.1)	1.13	<i>ns</i>
Married and/or cohabiting, <i>n</i>	95 (99.0)	37 (97.5)	40 (95.2)	17 (100)	2 (50.0)	2.42	<i>ns</i>
Educational level						29.90	***
Low, <i>n</i>	9 (9.4) ^a	10 (26.3) ^a	7 (16.7) ^a	1 (5.9) ^a	2 (50.0)		
Medium, <i>n</i>	25 (26.0) ^a	21 (55.3) ^b	18 (42.9) ^{ab}	3 (17.6) ^{ab}	2 (50.0)		
High, <i>n</i>	62 (64.6) ^a	7 (18.4) ^b	17 (40.5) ^{ab}	13 (76.5) ^a	0 (0.0)		

* $p < .05$, ** $p < .01$, *** $p < .001$

Classes with different characters (a, b, c) significantly differ on the indicated variable, $p < .05$; classes with similar characters do not differ from each other.

¹Class E-L was excluded from the F and χ^2 difference tests because of the small group size ($n = 4$).

Qualitative description of Class Extreme distress – Low-quality parenting

Class E-L consisted of only four mothers who reported the highest levels of distress and showed the lowest quality of interactive behavior. Moreover, they all had distorted attachment representations. This class was described qualitatively based on background and interview data, because this may give insight into the risk profiles of these mothers and provide a clinically useful addition to the quantitative results.

All four women gave birth to a preterm infant and in all cases other risk factors were present. The first mother went through a perinatal psychosis. Also, during the interview she reported that she experienced severe partner violence. While the infant was hospitalized, Child Protection Services were alarmed because her husband had threatened one of the nurses. The second mother was a single mother with a history of depression and anxiety disorders. During the interview she reported that she additionally experienced severe anger management problems. The third mother was single and had no contact with the infant's biological father. She had been diagnosed with borderline personality disorder and a dysthymic disorder, for which she received psychological treatment. The fourth mother was a mother of a twin pair, with a partner who already had a child with a former girlfriend. Mother indicated that her pregnancy was unplanned but wanted, yet her partner had been very unhappy with the pregnancy.

Next to the fact these mothers gave birth to a preterm infant, the situation these mothers found themselves in and/or their history of psychiatric problems could have resulted in very high levels of distress and a poor parenting quality.

DISCUSSION

This study was designed to investigate whether heightened levels of maternal distress after preterm birth place mother-infant dyads at risk for poor parenting. The results first of all confirmed previous findings that mothers of infants born preterm have significantly higher levels of psychological distress in the postpartum period than mothers of infants born at term gestation. Mothers of very preterm infants were particularly overrepresented in Classes H-M, H-H, and E-L, i.e., the classes characterized by the highest distress levels. However, there appeared to be substantial heterogeneity in mothers' emotional responsivity to the event of preterm birth. While heightened levels of maternal psychological distress seem inherent to the situation of preterm birth, as many as 43% of mothers of moderately preterm infants and 63% of mothers of very preterm infants were in Classes L-L and L-H, i.e., the classes with relatively low distress scores.

Interestingly, the classes characterized by high levels of postpartum distress, i.e., Class H-M, H-H, and E-L, contained mothers of wide-ranging parenting quality and, proportionally, most mothers of very preterm infants. At one extreme are mothers in Class H-H, who reported high distress rates and at the same time displayed high-quality parenting. The H-H profile indicates that high levels of maternal distress in the postpartum period do not necessarily place mother-infant dyads at increased risk of poor parenting. For these mothers, their high distress even seemed to encourage maternal involvement. Previously, Borghini et al. (2006) had already shown that parents of high-risk preterm infants, who were

emotionally distressed, anxious and worried in the postpartum period, particularly developed a strong bond with their infant. A plausible explanation could be given by the theory of compensatory care (Beckwith & Cohen, 1978), which states that parents may increase caregiving behavior to sick or high-risk infants to attenuate the effects of hazardous events, such as preterm birth. Another explanation could be derived from Janis' (1958) 'work of worry' theory, which emphasizes the positive value of psychological distress for recovery after surgery. Distress or worry is generally regarded as a discomforting and undesirable state of emotional arousal that prevents adequate functioning in stressful situations (Salmon, 1993). The 'work of worry' principle, however, postulates that anticipatory worrying may enable a person to adjust more adequately to a forthcoming threat. In contrast, alleviation of anxiety could even undermine effective coping. In the case of preterm birth, the experience of negative feelings, however painful, might nevertheless be important to help mothers to become aware of their new motherhood with the reality of having a preterm infant. Given these insights, one could wonder whether the same cut-off thresholds should be employed to determine the presence of maternal postpartum distress in both term and preterm populations, as in regular clinical practice.

Class E-L, on the other hand, shows why extreme levels of distress in new mothers may be of concern to clinicians working with families. This small group of only four mothers distinguished themselves by extremely high distress rates, intrusive interactive behaviors, and distorted infant representations. Apart from preterm childbirth, cumulative risk was indicated in this group by multiple factors, such as psychiatric problems, partner violence, family disruption, and low educational level. These findings once more demonstrate that the cumulative co-occurrence of different risk factors is often associated with disruptions in parenting (Trentacosta et al., 2008).

The other end of the spectrum includes mothers with relatively low levels of postpartum distress. Approximately two-thirds of mothers were classified in the two low distress groups, i.e., Class L-H or Class L-L. Nevertheless, here too, mothers' levels of postpartum distress were non-informative with regard to subsequent parenting quality. While Class L-H was characterized by low distress and high-quality parenting, Class L-L was characterized by low distress and low-quality parenting. Specifically, the behavior of mothers in Class L-L was marked by withdrawal, whereas their infant attachment representations were often disengaged. A substantial proportion (40%) of mothers in this class were mothers of very preterm infants. On the basis of these findings, one could wonder whether a lack of maternal distress in the case of very preterm birth should be considered as potentially worrisome as well. Questionnaires measuring depressive, anxiety, and PTSD symptoms, only have established cut-off thresholds at the high ends of the scales, not at the low ends. Consequently, when a mother reports no or few symptoms of distress, this may impart a false sense of security. Class L-L underlines the importance of remaining vigilant in the interpretation of low distress scores.

These results furthermore lead us to speculate why mothers in Class L-L might be more likely to engage in withdrawn and disengaged parenting. It could be that mothers who exhibit detached behavior have developed an avoidant attachment style themselves, even before the birth of their infant (Mikulincer & Shaver, 2012). Individuals may develop an avoidant style as a result of early experiences with a caregiver who, for instance, disapproves or punishes closeness and expressions of need or vulnerability (Ainsworth, Blehar, Waters, & Wall, 1978). In contrast to securely attached individuals, who are often raised by a responsive and sensitive caregiver who contributed to a sense of basic trust and confidence that stressful situations can be manageable, insecurely attached individuals are more likely

to deal with stressful experiences by deactivating strategies, such as a strong emphasis on self-reliance, inhibition of display of negative emotions, and avoiding closeness and interdependence in relationships. Perhaps mothers in Class L-L avoid closeness with their infant and inhibit negative emotions in the challenging event of (preterm) birth.

In conclusion, the groups with the lowest parenting scores experienced either extreme levels of distress (Class E-L) or, on the contrary, very little distress (Class L-L) in the postpartum period. We hypothesize that a curvilinear association exists between maternal distress and parenting quality after preterm birth. That is, moderate to high levels of distress may result in optimal parenting, while very low or very high distress levels may interfere with a mother's capacity to interact sensitively with her infant and form a balanced attachment representation. This study indicates that heightened maternal distress levels after preterm birth do not necessarily place mother-infant dyads at increased risk for poor parenting, and might even be beneficial. Conversely, low maternal distress levels do not necessarily indicate good-quality parenting and may be non-informative in that regard.

The strengths of the present study include the use of multimethod (observational and interview) measures to evaluate parenting quality and the use of LCA to shed light on the heterogeneity among mothers of infants born preterm. There are also limitations to consider. This is an explorative study on classes of mothers with varying levels of distress and parenting quality after preterm birth. Further research into the generalizability of these findings is therefore needed. The focus was exclusively on the mother-infant relationship. Future research should evaluate how paternal postpartum distress impacts on both maternal and paternal parenting quality. Moreover, further research should consider infant outcomes in relation to the different profiles.

Implications for clinical practice

Many parenting interventions are aimed at reducing postpartum distress in mothers of preterm infants. Results of this study prompt a reconsideration of the association between postpartum distress and parenting quality and challenge the notion that high maternal distress rates are always paralleled by poor parenting practices. Clinicians should realize that the presence of postpartum distress in mothers is not necessarily maladaptive to the mother-infant relationship, whereas the absence of distress does not always guarantee optimal parenting. Further, it is important that they consider heterogeneity in mothers' emotional responsivity to the event of preterm birth and are aware of other psychosocial and socioeconomic risk factors that mothers bring to their parenting. We suggest a multidimensional screening approach to identify mother-infant dyads in need of support. Screening of psychological distress should not stand alone, but should be complemented by assessment of the mother-infant relationship, so that appropriate psychological and/or parenting intervention can be offered.

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